TM 11-2561

WAR DEPARTMENT TECHNICAL MANUAL

REPRODUCER, SOUND, PORTABLE

RESTRICTED. DISSEMINATION OF RESTRICTED MATTER. No person is entitled solely by virtue of his grade or position to knowledge or possession of classified matter. Such matter is entrusted only to those individuals whose official duties require such knowledge or possession. (See also paragraph 23b, AR 380-5, 15 March 1944.)

WAR DEPARTMENT 18 DECEMBER 1944

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WAR DEPARTMENT,
WASHINGTON 25, D. C., 18 DECEMBER 1944.

TM 11-2561, Reproducer, Sound, Portable, is published for the information and guidance of all concerned.

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G. C. MARSHALL,
Chief of Staff.

Official:

J. A. ULIO,
Major General,
The Adjutant General.

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(For explanation of symbols see FM 21–6.)

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DESTRUCTION NOTICE

WHY —To prevent the enemy from using or salvaging this equipment for his benefit.

WHEN—When ordered by your commander.

HOW —1. Smash—Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.

2. Cut —Use axes, handaxes, machetes.

3. Burn —Use gasoline, kerosene, oil, flame throwers, incendiary grenades.

4. Explosives—Use firearms, grenades, TNT.

5. Disposal —Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT

WHAT—1. Smash—Base and speaker housing of carrying case, all tubes, loudspeaker, microphone, all transcriptions, crystal pick-up cartridge, and all auxiliary equipment.

2. Cut —Loudspeaker cord, microphone cord, power cable, external amplifier cable, and all cords for auxiliary equipment.

3. Burn —This technical manual, all papers, records, and all film slides and film strips of auxiliary equipment.

4. Bend —Tone arm and jacks.

5. Bury or scatter—All of the above items after they are completely destroyed.

DESTROY EVERYTHING

SAFETY NOTICE

The voltages used in this equipment may cause death or serious injury. Use caution when testing underneath the amplifier chassis as high voltages are present. Always disconnect the reproducer from the power source before making electrical adjustments or repairs.

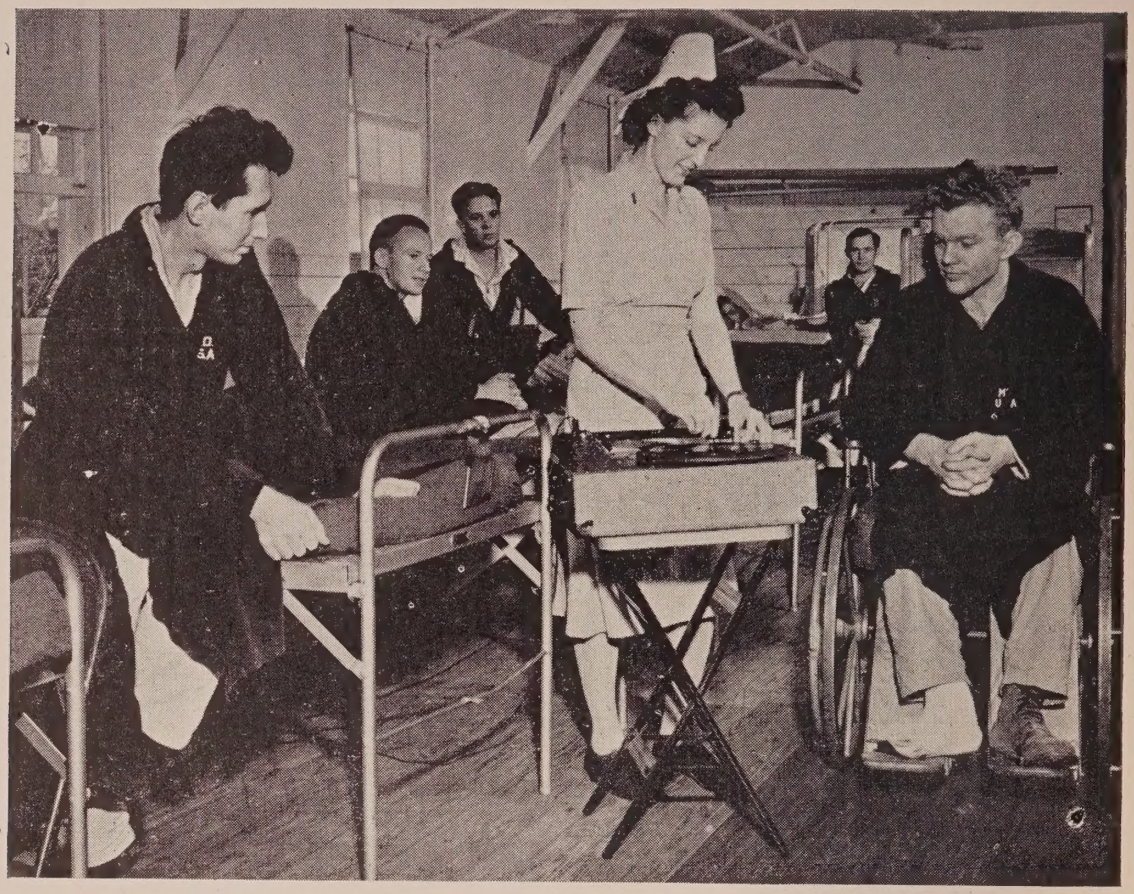


Figure 1. Reproducer, sound, portable, in operation in hospital ward.

PART ONE
INTRODUCTION

SECTION I
DESCRIPTION OF REPRODUCER, SOUND, PORTABLE

1. DESCRIPTION.

Reproducer, sound, portable, consists of a self-contained 2-speed turntable with pick-up arm, 5-tube amplifier, dynamic microphone, 8-inch permanent magnet dynamic loudspeaker, and associated connecting cables. It is intended to be used for reproducing sound recordings for morale and training purposes, general entertainment, and for use as a public address system.

2. APPLICATION.

The reproducer is designed to play records of 10-inch, 12-inch, and 16-inch sizes at speeds of 33⅓ or 78 revolutions per minute. Two input circuits permit the simultaneous use of voice or sound reproduction. By means of two individual volume controls, it is possible to superimpose speech on a recorded background in any desired proportion. An additional jack mounted on the control panel permits the output of the pick-up unit to be fed into an external amplifier if desired.

3. TECHNICAL CHARACTERISTICS.

a. Power Input. Power required for the reproducer is obtained from a 50- to 60-cycle, 110- to 115-volt, single-phase source. The power consumption of the reproducer is 70 watts when used independently.

b. Power Output. The amplifier in the reproducer has a power output of 7 watts at less than 5 percent distortion. This output is sufficient for indoor audiences of up to 300 persons or outdoor areas of approximately 1,500 square feet.

4. PACKAGING DATA.

The reproducer is packed in a cardboard shipping carton, 27 inches in height, 12 inches in depth, and 19 inches in length. The shipping weight is approximately 50 pounds, including spare parts (running spares).

NOTE: Running spares are for initial use only and are not to be requisitioned as a kit or a group.

5. COMPONENTS

a. Description of Reproducer. The Reproducer is mounted in a plywood carrying case, covered with a black and gray water-resistant material. The case, when closed and in the carrying position, is 19¾ inches in height, 10½ inches in depth, and 19 inches in length. The carrying case is metal-reinforced at the corners, and is provided with metal bumpers to protect the case. The case opens into two units, one unit housing the amplifier and turntable with pick-up assembly, the other unit housing the loudspeaker, cords, and microphone.

Figure 2. Reproducer, sound, portable, encased for transportation.

b. Amplifier Unit. The amplifier unit consists of a five-tube, three-stage, resistance-coupled amplifier, a tone arm with crystal pick-up cartridge, a 2-speed turntable, and a control panel. The top section of the control panel contains a male a-c receptacle for connection to the necessary power source.

a female a-c receptacle for supplying any external equipment, and three standard telephone jacks marked SPKR., PICKUP, and MIC, respectively. The slanted section of the control panel contains a pilot light, and three controls marked PWR. OFF — PWR. ON — BASS — TREBLE, PHONOGRAPH, and MICROPHONE.

Figure 3. Reproducer, sound, portable, with accessories.

c. Loudspeaker Unit. The speaker housing contains an 8-inch permanent-magnet, dynamic loudspeaker with a permanently connected, 75-foot, 2-conductor cord, terminating in a telephone plug. The microphone, complete with a 25-foot cord and plug, is held in place in the housing during transportation by a metal clip. A 10-foot power cable with male and female plugs attached, is also included. A 10-foot, single-conductor, shielded cord, terminating in a telephone plug on one end, is provided for feeding the pick-up output to an external amplifier.

SECTION II

INSTALLATION OF REPRODUCER, SOUND, PORTABLE

6. SITING.

Select a *level* location, such as a table top or other suitable surface, when the reproducer is to be used as a record player. This precaution is not necessary when the reproducer is used as a public address system.

7. UNPACKING AND CHECKING.

The reproducer is shipped in a heavy cardboard carton (fig. 4). One end of the carton is marked THIS SIDE UP. Open the carton at this end. Be careful not to damage any of the contents when opening the carton. Two small cartons will be found at the top of the carton under the cardboard spacer. Remove these small cartons. One of the cartons contains the spare tubes, and the other carton contains the spare resistors and capacitors. Take out the heavy cardboard separator. A large paper-wrapped package will now be seen. Remove this package from the carton. Remove the paper wrapping carefully. Do not use sharp or pointed tools. This package contains the reproducer.

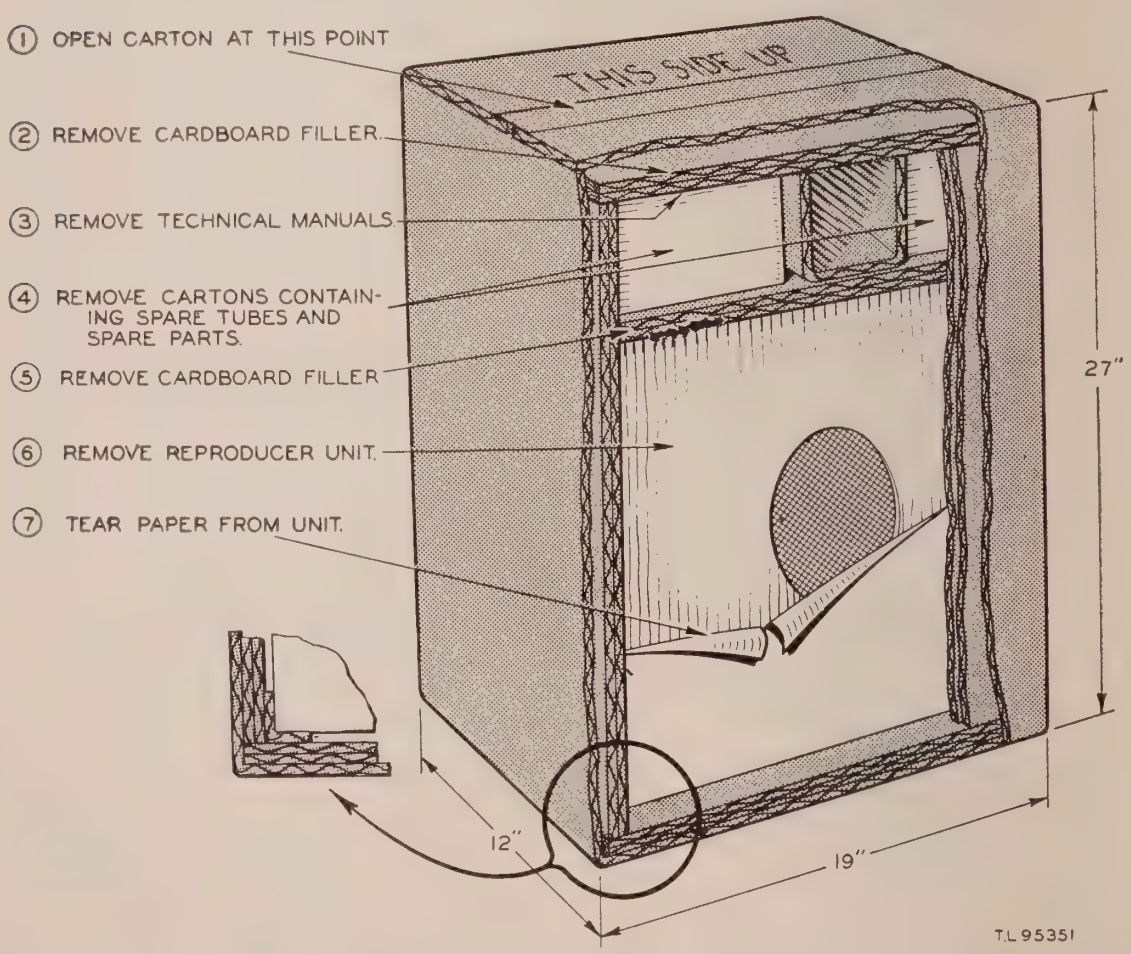


Figure 4. Reproducer packed in shipping carton.

8. CONNECTIONS AND INTERCONNECTIONS.

Use the following procedure in preparing the reproducer for operation:

a. Remove the upper part of the case that houses the loudspeaker, the microphone and attached cable, and power cord.

b. Check the power supply for correct voltage and frequency, normally 110 to 115 volts, 50-60 cycles. If an a-c voltmeter is not available for checking the line voltage, a low wattage incandescent lamp with a 110- to 120-volt rating may be used for a rough check. If the brilliancy of the lamp is low, the reproducer will not operate satisfactorily. If the brilliancy of the lamp is high, do not plug in the reproducer.

Figure 5. Reproducer ready for operation.

c. Connect the loudspeaker by inserting the plug on the end of the speaker cable into the jack marked SPKR.

d. When the reproducer is used as a public address system, install the loudspeaker in a location that will give maximum coverage of the audience. The loudspeaker should be placed from 20 to 30 feet from the microphone,

preferably in front of the microphone. This will assist in preventing howling, resulting from feedback when high gains are used.

e. Insert the plug on the microphone cable in the jack marked MIC.

f. Connect the reproducer to the a-c power supply by inserting the male plug of the power cord into a suitable a-c outlet and inserting the female plug into the a-c input receptacle at the far left on the top of the control panel.

9. INSTALLATION OF TUBES.

The reproducer is shipped fully equipped with all tubes in their respective sockets (fig. 16). Remove the grillwork panel in the back of the amplifier and remove the paper wrapping from the tubes before operating the amplifier. Check each tube individually for proper seating in its socket.

10. REPACKING INFORMATION.

Wind the loudspeaker cable around the clips provided. Place the microphone in the clips in the upper corner of the housing and wrap the cable around the clips provided. Wrap the shielded amplifier cord (for connecting the pick-up to an external emplifier) around the clips in the speaker housing unit. Fasten the two housings together and the reproducer is ready for transportation. For reshipment. place the reproducer in a strong cardboard carton or wooden case (fig. 4). Cushion well with clean waste paper. Place a covering of waterproof paper over the reproducer if it is available. Place the spare tubes and spare parts in separate containers and place them inside the carton or case.

PART TWO
OPERATING INSTRUCTIONS

NOTE: For information on destroying the equipment to prevent enemy use, refer to the destruction notice at the front of the manual.

SECTION III
CONTROLS AND THEIR USE

11. AMPLIFIER CONTROLS.

The amplifier is provided with three controls for operation as a public address system or as a record player (fig. 6).

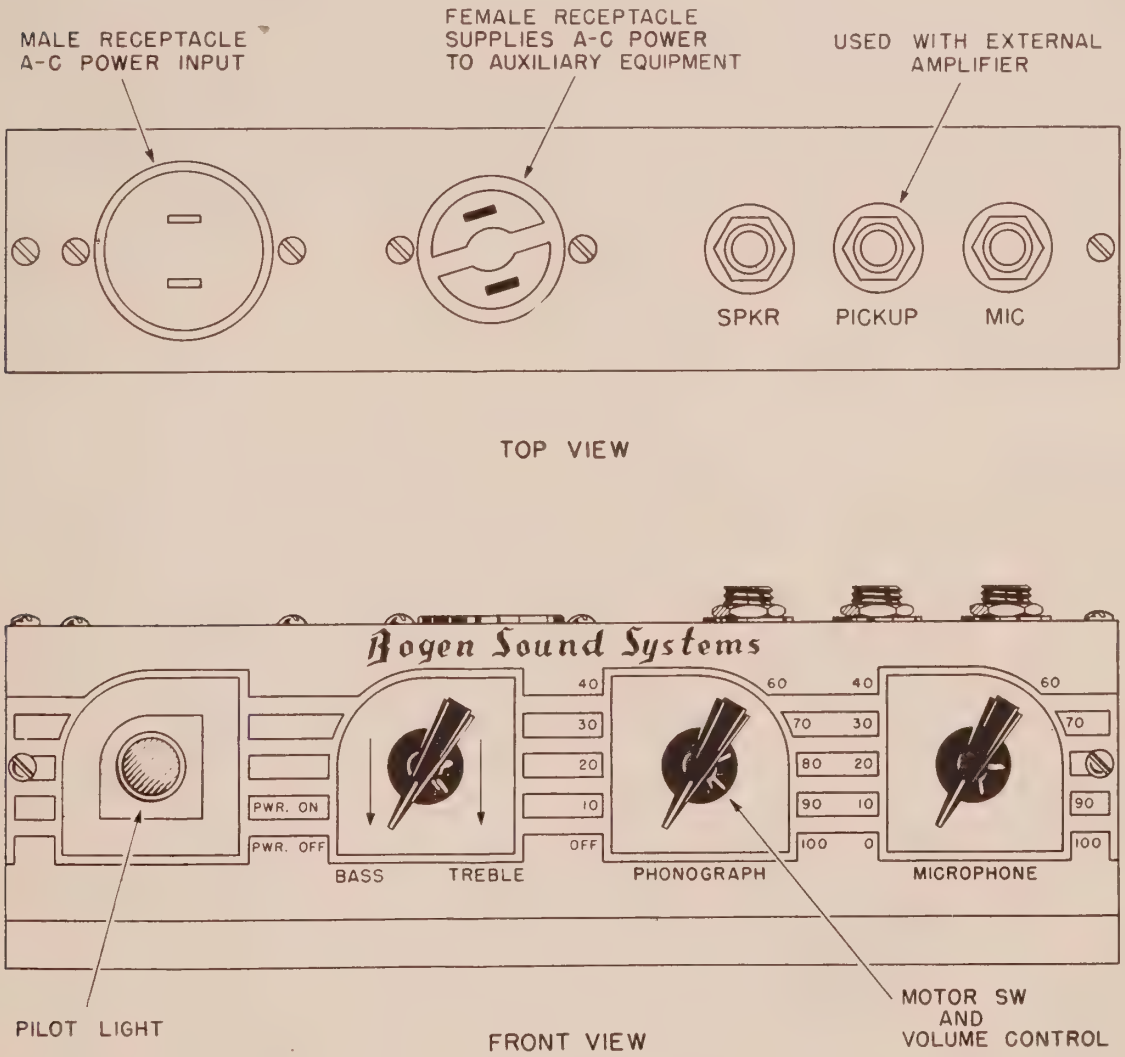


Figure 6. Top and front view of reproducer control panel.

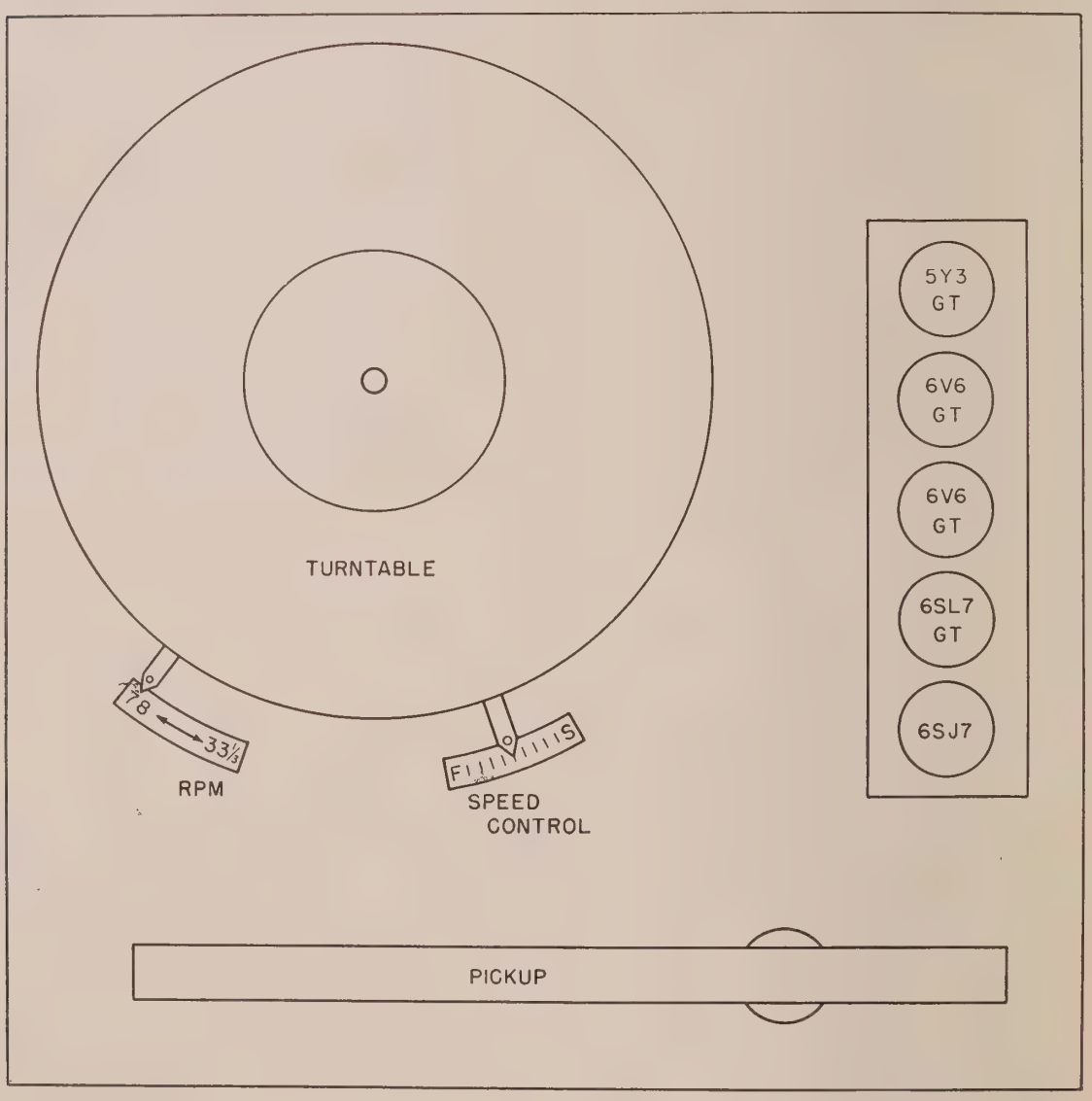
a. Power On-Off Control. The left-hand control marked POWER ON-POWER OFF-BASS-TREBLE, includes a master a-c switch and a tone control.

b. Phonograph Control. The center control marked PHONOGRAPH is a combined volume control for use with phonograph recordings and an a-c switch for supplying current for the turntable motor.

c. Microphone Control. The right-hand control marked MICROPHONE varies the volume when the reproducer is used as a public address system. When the microphone is not in use, this control should be turned off (all the way to the left) to prevent pick-up of extraneous noise.

12. TURNTABLE MOTOR CONTROLS.

The turntable motor is provided with two controls in the form of levers extending out from under the turntable (fig. 7).



REPRODUCER BASE TL 95198

Figure 7. Top view of reproducer amplifier unit.

a. Speed-change Lever. The lever controlling the speed change has two positions marked 33⅓ RPM—78 RPM and movement of the lever to either of the positions establishes the approximate turntable speed.

b. Speed Regulator Lever. The speed regulator lever control is located to the right of the speed change lever and is marked S—F. This lever controls the turntable motor governor and allows a 5 percent variation above or below the nominal turntable speed.

SECTION IV
OPERATION

13. STARTING.

After the reproducer has been installed (pars. 6, 7, 8, and 9) the following steps prepare the reproducer for operation:

a. Sound Recordings.

(1) Turn the left-hand control marked POWER ON-POWER OFF all the way to the right (fig. 6). This supplies power to the amplifier.

(2) Turn the center control marked PHONOGRAPH to the right to an approximate midway position on the dial (fig. 6).

(3) Allow 30 seconds for the amplifier to warm up, then rub the ball of thumb across the needle in the pick-up arm until a clicking sound is heard in the speaker.

(4) Determine the recording speed of the record to be used by examining the title plate of the record. There will be an indication on the title plate as to whether the recording speed was 33⅓ or 78 revolutions per minute.

(5) Move the lever controlling the speed to the proper speed of the recording (fig. 7). *This must be done while the motor is running.*

CAUTION: Move the speed change lever gently to the desired position. Do not force the clutch as this will jam the motor. Stop the movement of the speed change lever when pressure is felt at the exact dial plate designation of the speed desired.

(6) Set the speed regulator lever at the center line of the plate (fig. 7).

(7) Place the record on the turntable.

(8) Release the pick-up from its holding bracket by loosening the holding nut and lower the pick-up gently until its needle enters the starting groove

on the record. Be sure to retighten the holding nut to avoid vibration which will cause noise in the speaker.

(9) Adjust the PHONOGRAPH control until the proper volume is attained for the area to be covered (fig. 6).

(10) Move the POWER ON-POWER OFF-BASS-TREBLE control slowly to suppress surface noise on worn records or to reduce emphasis on high frequencies (fig. 6).

b. Public Address System. To use the reproducer as a public address system proceed as follows:

(1) Turn POWER ON-POWER OFF control all the way to the right (fig. 6).

(2) The PHONOGRAPH control should be returned to its OFF position (fig. 6).

(3) Adjust MICROPHONE control for the desired volume and speak into the microphone (fig. 6).

NOTE: To prevent howls resulting from feedback, keep the microphone 10 or 15 feet in back of the loudspeaker.

c. Superimposing Speech on Recorded Background. (1) To superimpose speech on recorded background follow procedure given in subparagraph *a* (1) through (10) above.

(2) Reduce volume by turning PHONOGRAPH control slightly to the left (fig. 6).

(3) Turn MICROPHONE control until the desired volume is obtained and speak into the microphone (fig. 6).

14. STOPPING.

When use of the reproducer is no longer required, turn off all controls, disconnect all equipment, and restore to holding brackets.

SECTION V
EQUIPMENT PERFORMANCE CHECK LIST

15. EQUIPMENT PERFORMANCE CHECK LIST.

The procedure indicated in the following list will provide a simple and rapid check to insure proper operation of the reproducer.

for drying, and then repeat spraying, brushing, and drying operations until three coats of varnish have been applied.

(9) When varnish is completely dry, remove all masking.

g. Reassembly.

CAUTION: Do not reassemble equipment until the varnish is thoroughly dry.

(1) Reassemble by following instructions for disassembly in reverse order.

(2) Make a complete operational check to make sure the equipment is in satisfactory operating condition.

h. Marking. Mark the equipment with "MFP" and the date of treatment. Place this marking near the nameplate or, if there is no nameplate, place it in a conspicuous location. EXAMPLE: MFP—7 Nov 1944.

PART THREE
PREVENTIVE MAINTENANCE

SECTION VI
PREVENTIVE MAINTENANCE TECHNIQUES

16. MEANING OF PREVENTIVE MAINTENANCE.

Preventive maintenance is a systematic series of operations performed at regular intervals on equipment, when turned off, to eliminate major break-downs and unwanted interruptions in service, and to keep the equipment operating at top efficiency. To understand what is meant by preventive maintenance, it is necessary to distinguish between preventive maintenance, trouble shooting, and repair. The prime function of preventive maintenance is to *prevent* break-downs and, therefore, the need for repair. On the other hand, the prime function of trouble shooting and repair is to locate and correct *existing* defects. The importance of preventive maintenance cannot be overemphasized. It is vitally important that operators and repairmen maintain their equipment properly.

NOTE: The operations in sections VI and VII are considered first and second echelon (organization operators and repairmen) maintenance. Some operations in section VIII and X are considered higher echelon maintenance.

17. DESCRIPTION OF PREVENTIVE MAINTENANCE TECHNIQUES.

a. General. Most of the electrical parts used in Reproducer, sound, portable, require routine preventive maintenance. Those requiring maintenance differ in the amount and kind required. Because hit-or-miss maintenance techniques cannot be applied, definite and specific instructions are needed. This section of the manual contains these specific instructions and serves as a guide for personnel assigned to perform the six basic maintenance operations namely: Feel, Inspect, Tighten, Clean, Adjust, and Lubricate. Throughout this manual the lettering system for the six operations will be as follows:

F—Feel.
I—Inspect.
T—Tighten.
C—Clean.
A—Adjust.
L—Lubricate.

The first two operations establish the need for the other four. The selection of operations is based on a general knowledge of field needs. For example, the dust encountered on dirt roads during cross-country travel filters into the equipment no matter how much care is taken to prevent it. Rapid changes in weather (such as heavy rain followed by blistering heat), excessive dampness, snow, and ice tend to cause corrosion of exposed surfaces and parts. Without frequent inspections and the necessary performance of tightening, cleaning, and lubricating operations, equipment becomes undependable and subject to break-down when it is most needed.

b. Feel. The feel operation is used most often to check rotating machinery, such as blower motors, drive motors, etc., and to determine if electrical connections, bushings, etc., are overheated. Feeling indicates the need for lubrication or the existence of similar types of defects requiring correction. The maintenance man must become familiar with the normal operating temperatures of motors, etc., in order to recognize signs of overheating.

NOTE: It is important that the feel operation be performed as soon as possible after shut-down and always before any other maintenance is done.

c. Inspect. Inspection is the most important operation in the preventive maintenance program. A careless observer will overlook the evidences of minor trouble. Although these defects may not interfere with the performance of the equipment, valuable time and effort can be saved if they are corrected before they lead to major break-downs. Make every effort to become thoroughly familiar with the indications of normal functioning, in order to be able to recognize the signs of a defective reproducer. Inspection consists of carefully observing all parts of the equipment, noticing their color, placement, state of cleanliness, etc. Inspect for the following conditions:

(1) Overheating, as indicated by discoloration, blistering, or bulging of the parts or surface of the container; leakage of insulating compounds; and oxidation of metal contact surfaces.

(2) Placement, by observing that all leads and cabling are in their original positions.

(3) Cleanliness, by carefully examining all recesses in the units for accumulation of dust, especially between connecting terminals. Parts, connections, and joints should be free of dust, and other foreign matter. In tropical and high-humidity locations, look for fungus growth and mildew.

(4) Tightness, by testing any connection or mounting which appears to be loose.

d. Tighten, Clean, and Adjust. These operations are self-explanatory. Specific procedures to be followed in performing them are given wherever necessary throughout part three.

The first audio stage, using Tube JAN-6SL7GT (VT-229), a twin-grid amplifier tube, receives the signal voltage from the pre-amplifier or the pick-up arm, or both, and operates as an amplifier and phase inverter to drive the push-pull output stage. The signal fed to the grid (pin 1)* of the tube (VT-229) is amplified in the first triode unit of the tube (fig. 14). The grid** (pin 4) of the second triode unit is connected to the plate (pin 4) of the first triode unit (fig. 14). Two signal voltages, equal in magnitude, but 180° opposite in phase, are developed in the cathode-plate circuit of the second triode unit across resistors R-12 and R-11 (fig. 14). The signal voltage appearing in the plate circuit is 180° out of phase with the grid voltage, while the signal voltage in the cathode circuit rises and falls with the grid voltage, thus being in phase with the grid voltage. The resulting voltages, equal in magnitude, but opposite in phase, are fed through capacitors C-2 and C-3 to the grids (pin 5 of each tube) of the two Tubes JAN-6V6GT (VT-107) in the push-pull output stage. The signal is given final amplification in this stage and fed to the loudspeaker through transformer T-2 and jack J-3 (fig. 14). A portion of the signal is fed from the center tap of transformer T-2 back to the cathode (pin 3) of the first triode unit of Tube JAN-6SL7GT (VT-229) through resistor R-5. The use of this type of inverse feedback circuit greatly reduces the distortion, thus improving the quality of reproduction. Tone control is obtained by using a potentiometer R-3 (TONE CONTROL) connected in series with a capacitor C-1, and connected between the grid (pin 1) of the first audio stage and ground (fig. 14). The higher frequencies can be bypassed to ground and the lower frequencies emphasized by varying the setting of the potentiometer R-3. The required a-c and d-c voltages are supplied by rectifier Tube JAN-5Y3GT (VT-197-A), power transformer T-1, and a filter system comprised of two 10-mf capacitors (C-11A and C-11B) and resistor R-6 (fig. 14).

b. Microphone. The microphone is of the dynamic type with a good response over a frequency range of 60 to 7.500 cycles per second. A microphone stand is not provided, but the coupling on the bottom of the microphone will fit any standard microphone stand with a 5/8-inch diameter with 27 threads per inch.

c. Pick-up Arm. The pick-up arm is of the crystal type with an easily

*All pin numbers are shown in figure 15.

****CAUTION:** When measuring tube socket voltages and comparing them with values shown in figure 15, it will be found that a positive voltage of approximately 70 volts exists between the grid (pin 4) of Tube JAN-6SL7GT and ground. The actual grid voltage should be measured between the grid (pin 4) and the cathode (pin 6) of this tube. A voltage measurement between these pins will show no voltage or a few tenths of a volt (negative).

f. Lubricate (L). Every 256 operating hours lubricate the motor bearings by removing the turntable as indicated in subparagraph *a.* above, and apply —3 or 4 drops of Oil, Engine, SAE No. 10, U. S. Army Spec. No. 2-104B in each of the three visible oil holes (fig. 8). Remove surplus oil from around the oil holes with a clean, dry cloth.

19. AMPLIFIER TUBES AND SOCKETS.

NOTE: Avoid working on the amplifier tubes immediately after shut-down. Severe burns may result from contact with the envelopes of hot tubes.

a. Inspect (I) (1) Inspect glass and metal tube envelopes for accumulation of dirt (fig. 16). When tubes with loose envelopes are found, replace tubes if possible.

(2) Inspect the firmness of tubes in their sockets. Make the inspection by pressing the tubes down in the sockets and test them in that position, *not* by partially withdrawing the tubes and jiggling them from side to side. Movement of a tube tends to weaken the pins in the base and to spread the contacts in the socket unnecessarily. It is desirable to inspect the sockets at the time the tubes are removed.

(3) When it is necessary to remove a tube from its socket, care must be used. Never jar a warm tube.

b. Clean (C). (1) Clean the tubes, but only if inspection shows cleaning to be necessary. The tubes used in the amplifier operate at low voltages and not having exposed grid and plate caps do not require frequent cleaning. However, do not permit dirt to accumulate on the tubes.

(2) Remove dust and dirt from the glass or metal tube envelopes with a clean, lint-free, dry cloth.

(3) When tube sockets are cleaned and the contacts are accessible, fine sandpaper may be used to remove corrosion, oxidation, and dirt.

20. RESISTORS.

a. Inspect (I). Inspect the bodies of resistors for blistering and discoloration which indicate overheating (fig. 17). Look for arc pits. Inspect all connections for corrosion, dirt, dust, and looseness. Look for broken strands in the connecting wire. Do not attempt to move resistors with pigtail connections because of the danger of breaking the pigtail connection at the point where it enters the body of the resistor. Such damages cannot be repaired. Inspect the connections of the pigtail resistors for proper soldering.

b. Clean (C). (1) Clean resistors with pigtail connections with a small brush dipped in Solvent. Dry-cleaning, Federal Spec. No. P-S-661a.

(2) Discolored resistors cannot be cleaned. Slight discoloration of the resistor body at the center is normal. Excessive discoloration, however, is indicative of overloading at some time prior to the inspection and is probably due to some circuit trouble which requires analysis.

21. POTENTIOMETERS.

a. Inspect (I). The mechanical operation of the potentiometers should be checked. Inspect the assembly and mounting screws and nuts (fig. 16). All metallic parts should be inspected for dust, dirt and corrosion.

b. Tighten (T). Tighten all loose assembly or mounting screws.

22. TRANSFORMERS.

a. Inspect (I). (1) Inspect transformers for general cleanliness. Examine for tightness of connections, terminals, mountings, and rivets (fig. 16).

(2) Inspect transformers for signs of overheating indicated by the presence of insulating compound on the outside seams of the cases.

b. Clean (C). The cases of the transformers should be cleaned with a dry cloth. In some instances it may be necessary to use a dry-cleaning solvent to remove foreign matter. Corroded contacts or connections can be sandpapered and wiped clean.

c. Tighten (T). Tighten all loose mounting screws or connections. Do not disturb the placement of the wires. If it is necessary to remove wires to tighten mounting screws, tag the wires before unsoldering so that they can be restored to their original positions.

23. MICROPHONE.

a. Inspect (I). Inspect the microphone housing for dirt and cracks. No attempt should be made to disassemble the microphone.

b. Clean (C). Clean the housing of the microphone with a clean, dry cloth.

24. LOUDSPEAKER.

a. Inspect (I). Inspect the loudspeaker for accumulations of dust, dirt, and other foreign matter.

(2) Inspect the diaphragm for signs of cracks.

b. Clean (C). Clean the loudspeaker with a clean, dry cloth. Remove all dust, dirt, and lint.

25. CABLE ASSEMBLY AND CORDS.

a. Inspection (I). Inspect cables and cords for cracked or deteriorated insulation, frayed or cut insulation at the connecting points.

b. Tighten (T). Tighten all loose clamps and connections.

c. Clean (C). Clean all dirty or corroded connections. The easiest way to clean a dirty connection is to remove the connection and clean it with a brush dipped in dry-cleaning solvent. Make sure that the connection is thoroughly dried with a dry cloth. Clean corroded connections with #0000 sandpaper.

SECTION VII

ITEMIZED PREVENTIVE MAINTENANCE

26. INTRODUCTION.

For ease and efficiency of performance, it is suggested that preventive maintenance on Reproducer, sound, portable be broken down into operations that can be performed at different time intervals. In this section the preventive maintenance work to be performed on the reproducer at specified time intervals is broken down into units of work called items. The general techniques involved and the application of the FITCAL operations in performing preventive maintenance on individual parts are discussed in section VI. These general instructions are not repeated in this section. When performing preventive maintenance, refer to section VI if more information is required for the following items. All work is to be performed with the power removed from the equipment. After preventive maintenance has been performed on a given day, the equipment should be put into operation and checked for satisfactory performance. (See par. 15, equipment performance check list.)

27. COMMON MATERIALS NEEDED.

The following materials will be needed in performing preventive maintenance:

Clean cloth
#0000 sandpaper
Solvent, Dry-cleaning, Federal Spec No. P-S-661a.

NOTE: Leaded gasoline will not be used as a cleaning fluid for any purpose. Solvent, Dry-cleaning, Federal Spec. No. P-S-661a, is available, as a cleaning fluid, through established supply channels. Oil, Fuel, Diesel, U. S. Army Spec. No. 2-102B, may be used for cleaning purposes when dry-cleaning solvent is not available. Since unleaded gasoline is available only in limited quantities, and only in certain locations, it should be used for cleaning purposes only when no other agent is on hand. Carbon tetrachloride, or fire-extinguishing liquid (carbon tetrachloride base), will be used, if necessary, *only on contact parts of equipment.*

28. PREVENTIVE MAINTENANCE CHECK LIST.

Item No.	Operations	Item	When performed							Echelon
			Before operation	After operation	Daily	Weekly	Monthly	Semi-annually	Yearly	
1	ITC	Exterior of Reproducer			X					1st
2	F	Motor		X			X			1st
2	ITC	Motor					X			1st
2	A	Motor	X							1st
2	L	Motor		Every 256 operating hrs.						1st
		Amplifier								2nd
3	IC	Tubes and Sockets	X				X			2nd
4	IC	Resistors		X			X			2nd
5	IT	Potentiometers	X				X			2nd
6	ITC	Transformers		X			X			2nd
7	IC	Microphone	X		X					1st
8	IC	Loudspeaker	X		X					1st
9	ITC	Cable assembly and cords	X			X				1st

F Feel — I Inspect — T Tighten — C Clean — A Adjust — L Lubricate

SECTION VIII
LUBRICATION

Lubrication instructions appear in section VI, preventive maintenance techniques, paragraph 18*f*.

SECTION IX
MOISTUREPROOFING AND FUNGIPROOFING

29. GENERAL.

The operation of Signal Corps equipment in tropical areas where temperatures and relative humidity are extremely high requires special attention.

The following items represent problems which may be encountered in operation:

a. Resistors, capacitors, and transformer windings fail.

b. Electrolytic action takes place in resistors, transformer windings, etc., causing eventual break-down.

c. Hook-up wire and cable insulation break down. Fungus growth accelerates deterioration.

d. Moisture forms electrical leakage paths on terminal boards and insulating strips, causing flash-overs.

30. TREATMENT.

A moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection against fungus growth, insects, corrosion, salt spray, and moisture. The treatment involves the use of a moisture- and fungi-resistant varnish applied with a spray gun or brush. Refer to TB SIG 13, Moistureproofing and Fungiproofing Signal Corps Equipment, for a detailed description of the varnish-spray method of moistureproofing and fungiproofing, and the supplies and equipment required in this treatment.

CAUTION: Varnish spray may have toxic effects if inhaled. To avoid inhaling spray, use a respirator if available; otherwise, fasten cheesecloth or other cloth material over nose and mouth.

31. STEP-BY-STEP INSTRUCTIONS FOR TREATING REPRODUCER, SOUND, PORTABLE.

a. Preparation. Make all repairs and adjustments necessary for proper operation of the equipment.

b. Disassembly. (1) Remove turntable.

(2) Remove main panel (containing turntable motor and amplifier) from case by removing 10 wood screws located along edges of panel.

(3) Unsolder two pick-up leads at terminal connector, located on the side of the amplifier chassis. These leads connect the pick-up device to the amplifier.

(4) Unsolder two motor leads at terminal connector, located on front side of amplifier chassis.

(5) Remove four machine screws to release amplifier chassis (including control panel) from main panel.

(6) Remove grill from rear of control panel by removing four self-tapping screws.

NOTE: Tighten all electrical connections (screws and nuts) and all mounting screws before masking.

c. Cleaning. Clean all dirt, dust, rust, fungus, oil, grease, etc., from components to be treated.

NOTE: Unless cleaning is done carefully and completely, the effectiveness of the moistureproofing and fungiproofing operation will be impaired.

d. Masking. (1) Remove all vacuum tubes from their sockets to facilitate the masking procedure.

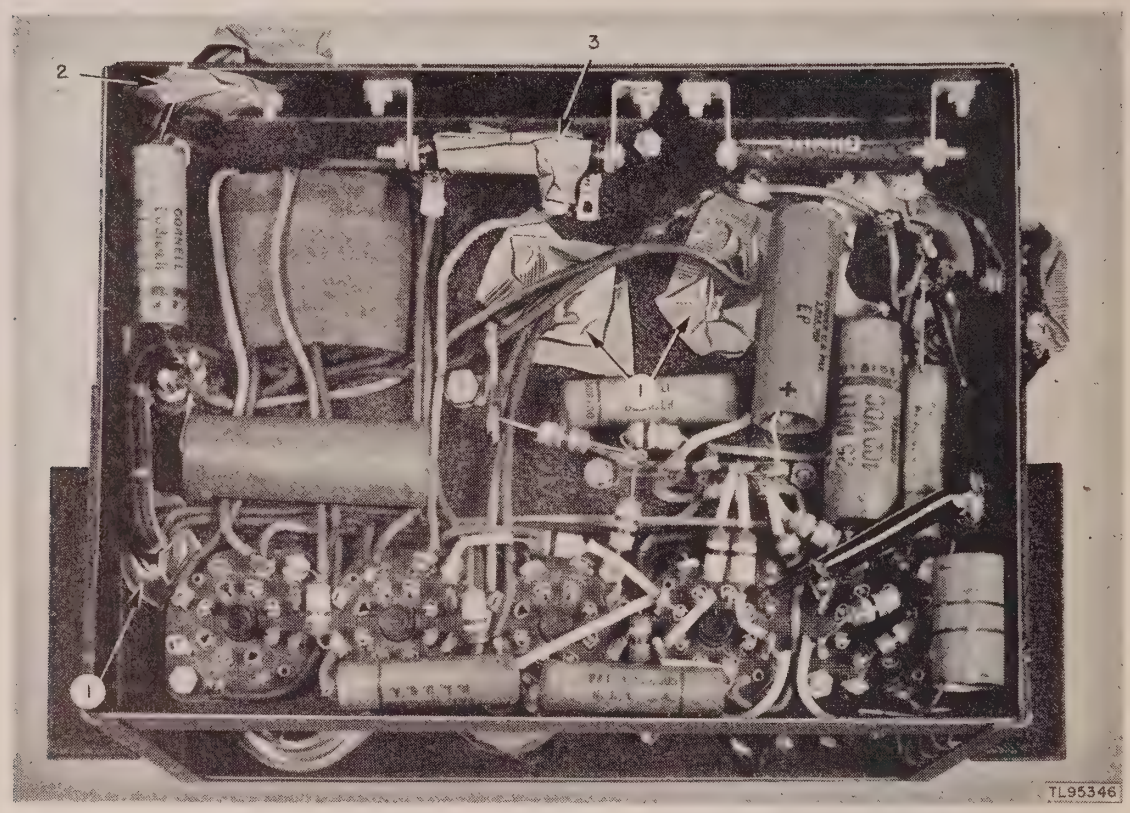


Figure 9. Reproducer amplifier chassis, bottom view, masking details.

(2) Mask the three rubber chassis-grommets (figs. 10 and 11 (1)).

(3) Apply petroleum jelly (vaseline) to all prongs of all vacuum tubes and replace the vacuum tubes in their respective sockets after the masking has been completed.

(4) Mask the 5Y3GT rectifier tube by using paper and masking tape. Cover the entire envelope of the tube.

(5) Mask the three rubber chassis-grommets on the under side of the amplifier chassis (fig. 9 (1)).

(6) Mask the rubber grommet for the motor leads (fig. 9 (2)).

(7) Mask the wire-wound resistor and slide (fig. 9 (3)).

(8) Mask the terminal connector for the pick-up leads, located on one end of the amplifier chassis (fig. 10 (3)).

(9) Mask the terminal connector for the motor leads located on the front of the amplifier chassis (fig. 10 (4)).

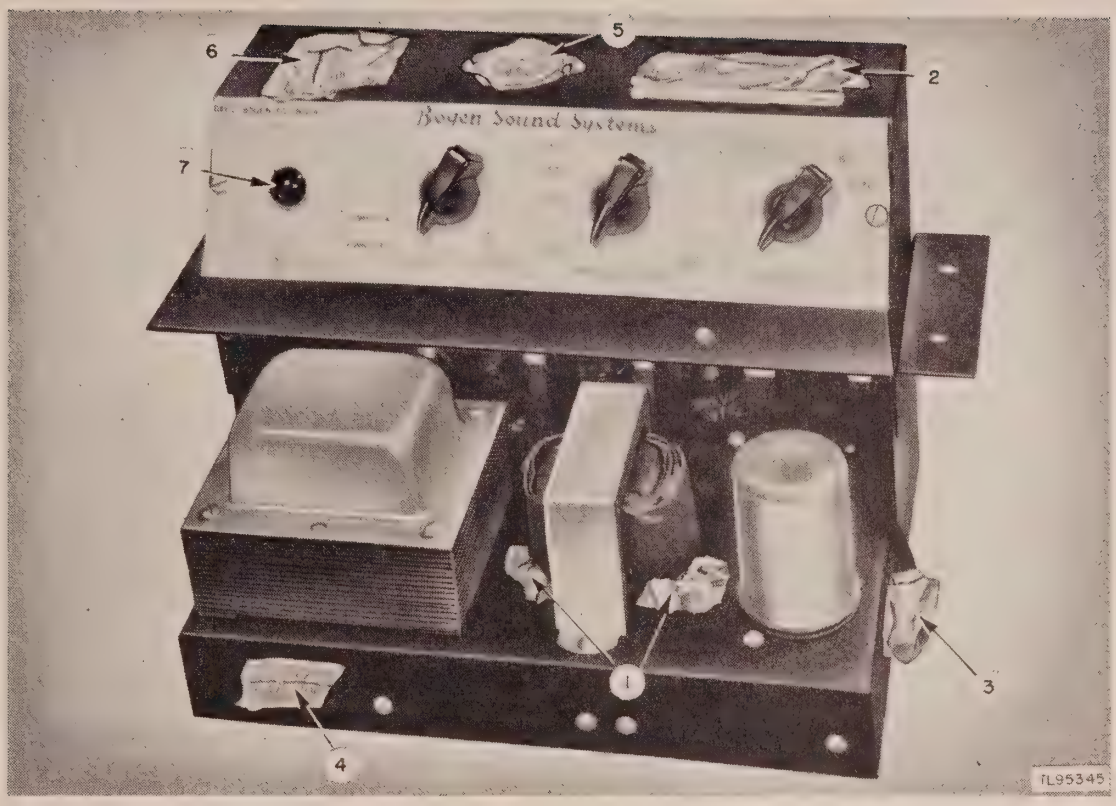


Figure 10. Reproducer amplifier chassis, front view, masking details.

(10) Mask the 2-prong female receptable on the top of the control panel (fig. 10 (5) and fig. 11 (6)).

(11) Mask the 2-prong male receptable on the top of the control panel by stuffing paper loosely in the hole and covering the top with masking tape (fig. 10 (6)).

(12) Mask the holes of the three jacks (figs. 10 and 11 (2)).

(13) Apply a coat of petroleum jelly to the glass over the pilot light (fig. 10 (7)).

(14) Mask the breather holes of the three potentiometers (fig. 11 (3)).

(15) Thoroughly mask the three jacks (SPKR jack, PICKUP jack, and MIC jack) (fig. 11 (4)).

(16) Mask the pilot lamp and pilot light socket (fig. 11 (5)).

e. Drying. Place the equipment to be treated in a drying oven and bake for 4 to 6 hours at 140° F.

CAUTION: Do not exceed 140° F. If wax in any component part should begin to soften or melt, decrease the temperature and increase the drying time 1 hour for each 10° F decrease in temperature.

f. Varnishing. (1) Inspect all masking to make sure that it has not come loose during the drying process.

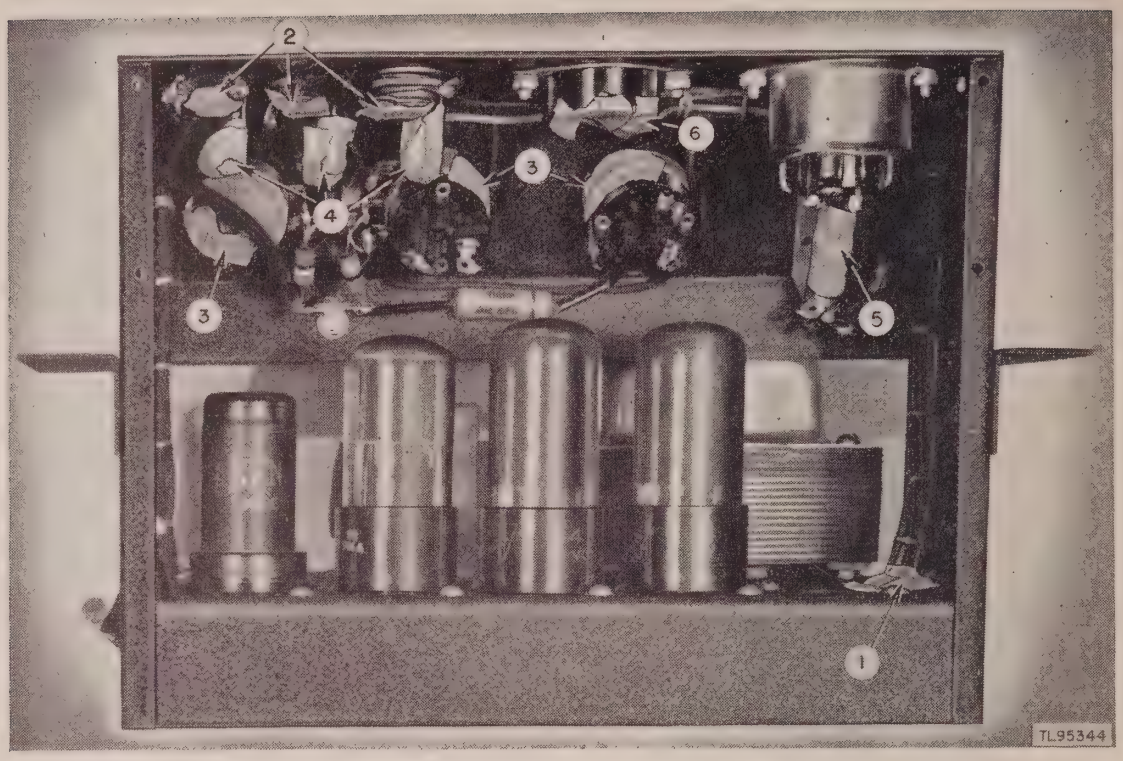


Figure 11. Reproducer amplifier chassis, rear view, rectifier tube removed, masking details.

(2) Push the wiring connecting the control panel and amplifier away from any contact with the chassis so that it may be thoroughly sprayed.

(3) Spray one coat of Varnish Lacquer, Fungus-resistant, Spec. No. 71-2202 (stock No. 6G1005.3), or equal on the amplifier and control panel.

CAUTION: Do not aim the varnish spray directly at the vacuum tubes, or any of the masked parts. Spray with an oscillating movement. It is not necessary to spray the front of the control panel directly.

(4) Using a brush, apply one coat of varnish to any portions not reached by the spraying process. Make sure that all wiring of the amplifier chassis and control panel is adequately covered with varnish.

(5) *Brush* (do not spray) two protective coats of varnish on all *unfinished* wood of equipment carrying case. It is not necessary to varnish weather-proofed portions of the carrying case.

(6) *Brush* varnish on the two motor leads, located on the turntable motor.

(7) *Brush* varnish on edge and bottom side of turntable.

CAUTION: Do *not* apply varnish to any parts of turntable motor mechanism, particularly moving parts. Do *not* apply varnish to rubber shock cushions of motor mechanism. Do *not* apply varnish to loud-speaker cone or microphone. Do *not* apply varnish on *any* rubber cord or wires, such as power cable, microphone cord, pick-up leads, etc.

(8) Replace amplifier and control panel in oven, allowing 15 or 20 minutes

CHECK LIST

Type of operation	Setting of Controls	Connections	Normal indication	Corrective measure
Phonograph operation.	POWER ON-POWER OFF control ON. PHONOGRAPH control ON. MICROPHONE control at 0.	Loudspeaker plug inserted in SPKR jack.	Click should be heard in loudspeaker when ball of thumb is rubbed across the pick-up needle.	Check loudspeaker plug for proper contact. Check PHONOGRAPH control to see that it is advanced enough.
Public address operation.	POWER ON-POWER OFF control ON. MICROPHONE control ON. PHONOGRAPH control OFF.	Loudspeaker plug inserted in SPKR jack. Microphone plug inserted in MIC jack.	Reproduction of voice in loudspeaker.	Check loudspeaker and microphone jacks for proper contact. Check MICROPHONE control to see if it is advanced sufficiently.
Pick-up to be used on external amplifier.	POWER ON-POWER OFF control ON. MICROPHONE control ON. MICROPHONE control at 0.	10 ft. cord connector plug inserted in PICK-UP jack.	Click should be heard in loudspeaker when ball of thumb is rubbed across pick-up needle.	Check 10 ft. connector cord plug for proper contact and insertion in proper jack. Check for proper connections at other end of 10 ft. connector cord. Check PHONOGRAPH control and speaker connections of external amplifier.

PART FOUR
AUXILIARY EQUIPMENT

SECTION X
FILMSTRIP PROJECTOR

32. USE OF FILM STRIP PROJECTOR.

A film strip projector, such as Projector PH-222 or PH-222-A, may be used with the reproducer by placing the reproducer and the projector on a suitable table (fig. 12). Power for operating the projector may be secured by inserting the projector power-cord plug into the auxiliary equipment 110-volt a-c outlet on top of the reproducer control panel. Detailed instructions for operating Projector PH-222 or PH-222-A will be found in TM 11-408.

NOTE: A film strip projector is not furnished with the reproducer.

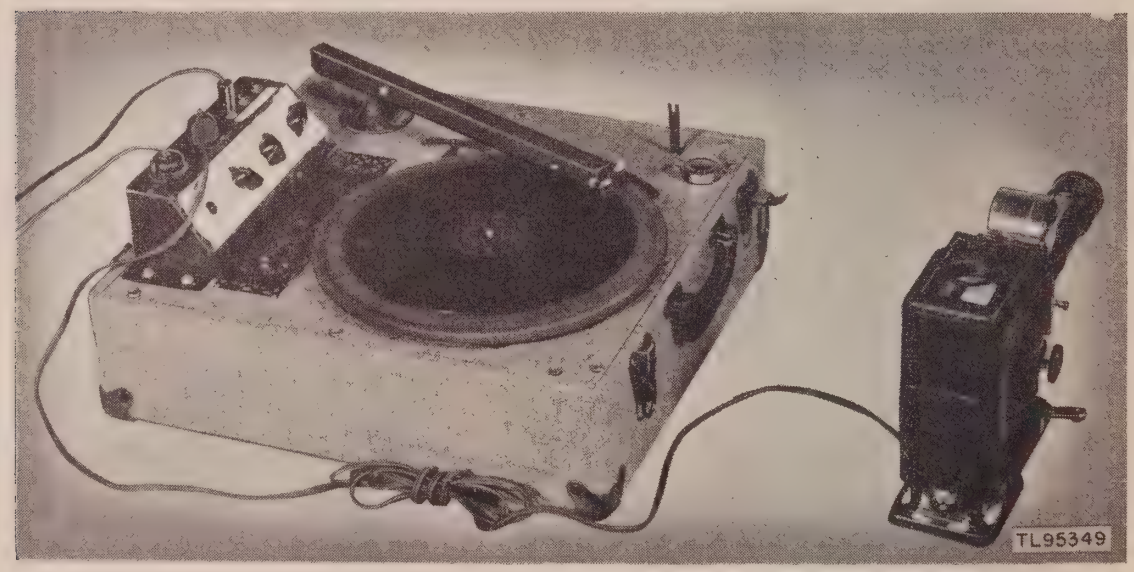


Figure 12. Reproducer in operation with Projector PH-222.

PART FIVE

REPAIR INSTRUCTIONS

NOTE: Failure or unsatisfactory performance of equipment used by Army Ground Forces and Army Service Forces will be reported on W.D., A.G.O. Form No. 468 (Unsatisfactory Equipment Report). For particulars see paragraph 40. If Form No. 468 is not available, see TM 38-250. Failure or unsatisfactory performance of equipment used by Army Air Forces will be reported on Army Air Forces Form No. 54 (unsatisfactory report).

SECTION XI
THEORY OF EQUIPMENT

33. FUNCTIONING OF REPRODUCER.

a. Amplifier. The reproducer amplifier uses a resistance-coupled push-pull inverse feedback type circuit. The output of the microphone or the output of the pick-up, or the output of both, is fed into the amplifier. The output of the microphone passes through Tube JAN-6SJ7 (VT-116), ampli-

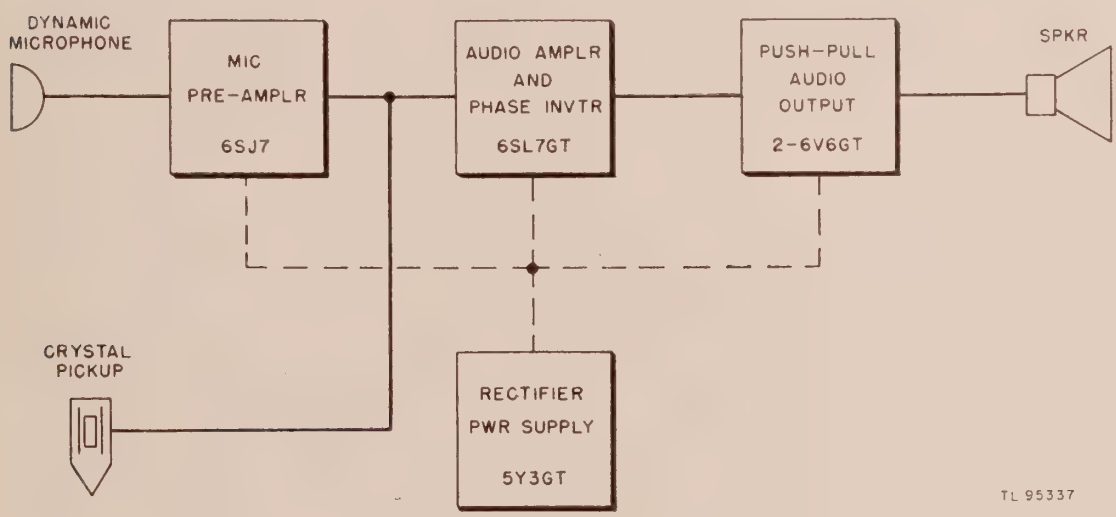


Figure 13. Block diagram showing stage-by-stage functioning of reproducer.

fying the output of the microphone. The desired signal voltage is obtained by varying potentiometer R-1 (MIC GAIN CONTROL) (fig. 14), thus controlling the signal voltage fed through resistor R-19 to the first audio stage from the pre-amplifier. The signal voltage from the pick-up arm is controlled by varying potentiometer R-2 (VOLUME CONTROL) (fig. 14), which is connected across the pick-up arm, and, with its movable contact, connected through resistor R-18 to the grid of Tube JAN-6SL7GT (VT-229).

Whenever a loose connection is tightened, it should be moistureproofed and fungiproofed again by applying the varnish with a small brush. See section IX for details of moistureproofing and fungiproofing.

CAUTION: Screws, bolts, and nuts should not be tightened carelessly. Fittings tightened beyond the pressure for which they are designed will be damaged or broken.

e. Lubricate. Lubrication refers to the application of grease or oil to the bearings of motors or other rotating shafts. It may also mean the application of a light oil to door hinges or other sliding surfaces on the equipment.

18. TURNTABLE MOTOR.

a. Feel (F). Remove the turntable and feel the motor frame for indications of overheating. The turntable is removed by lifting it off the shaft.

b. Inspect (I). (1) Inspect the motor for discoloration, indication of overheating, and for dirt, dust, fungus, and mildew.

(2) Test any connections and mounting bolts which appear to be loose.

c. Tighten (T). Tighten loose connections and mounting bolts.

d. Clean (C). Remove all dust, dirt, lint, and oil from the motor. Use a clean, dry, lint-free cloth. Remove any accumulation of oil from around the three oil holes.

e. Adjust (A). The speed regulator lever allows 5 percent variation above or below the nominal speed. Nominal speed is attained when the lever pointer is centered over the center line of the plate (fig. 7).

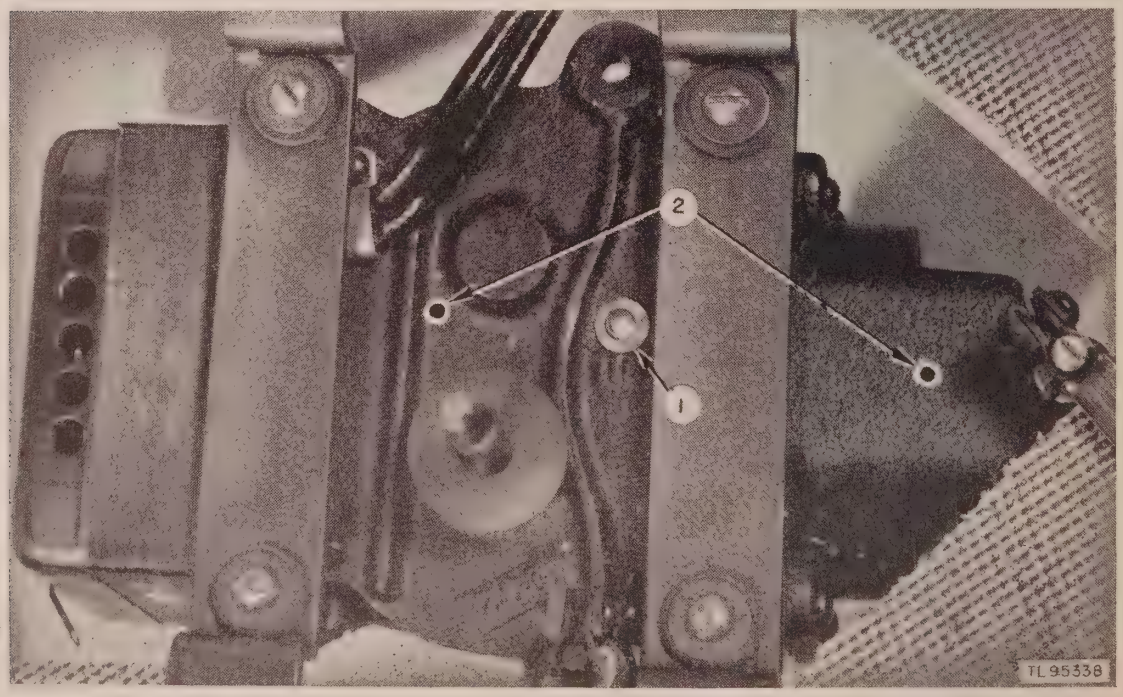


Figure 8. Lubrication points, turntable motor.

replaced crystal cartridge. The arm is well-balanced with a needle pressure not exceeding 3 ounces and an output voltage of 2.5 volts.

d. Turntable Drive. The turntable is driven by a governor-controlled. dual-speed, gear-drive, 115-volt. 60-cycle, single-phase motor. A uniform speed is obtained under normal variations in line voltage and load. The gears operate in an oil bath in a sealed case and usually will not require attention during the life of the motor.

e. Loudspeaker. The loudspeaker is an 8-inch. permanent-magnet, dynamic speaker. The speaker is actuated by a voice coil with 6-ohm impedance, and will handle an output up to 8 watts without blasting or distortion.

SECTION XII
TROUBLE SHOOTING

34. GENERAL TROUBLE-SHOOTING INFORMATION.

No matter how well equipment is manufactured. faults will develop in service. When such faults occur. the repairman must locate and correct them as rapidly as possible. This section contains general information to aid personnel engaged in the important duty of trouble shooting.

a. Trouble-shooting Data. Take advantage of the material contained in this manual to help in the rapid location of faults. Consult the following trouble-shooting data when necessary:

(1) Block diagram of Reproducer, sound. portable (fig. 13).

(2) Complete schematic diagram (fig. 14).

(3) Voltage and resistance data for all socket connections (fig. 15).

(4) Illustrations of components (figs. 16 and 17). (Front. top, and bottom views will aid in locating and identifying parts.)

(5) Pin connections. Pin connections on sockets are numbered on the voltage and resistance chart (fig. 15).

b. Trouble-shooting Steps. The first step in servicing a defective reproducer is to sectionalize the fault. Sectionalization means tracing the fault to the component or circuit responsible for the abnormal operation of the reproducer. The second step is to localize the fault. Localization means tracing the fault to the defective part responsible for the abnormal condition. Some faults such as burned-out resistors and shorted transformers can be located by sight and smell. The majority of faults, however. must be located by checking voltage and resistance.

35. TEST EQUIPMENT REQUIRED.

The only equipment required for testing the reproducer is a volt-ohm-milliameter of the high-resistance type. All voltage and resistance measurements as shown in figure 15 should be duplicated ± 10 percent. The meter used in these measurements was of the 20,000 ohms per volt d-c, 1,000 ohms per volt a-c type. For details of operation of the test equipment see the operating instructions accompanying the equipment. No test equipment is

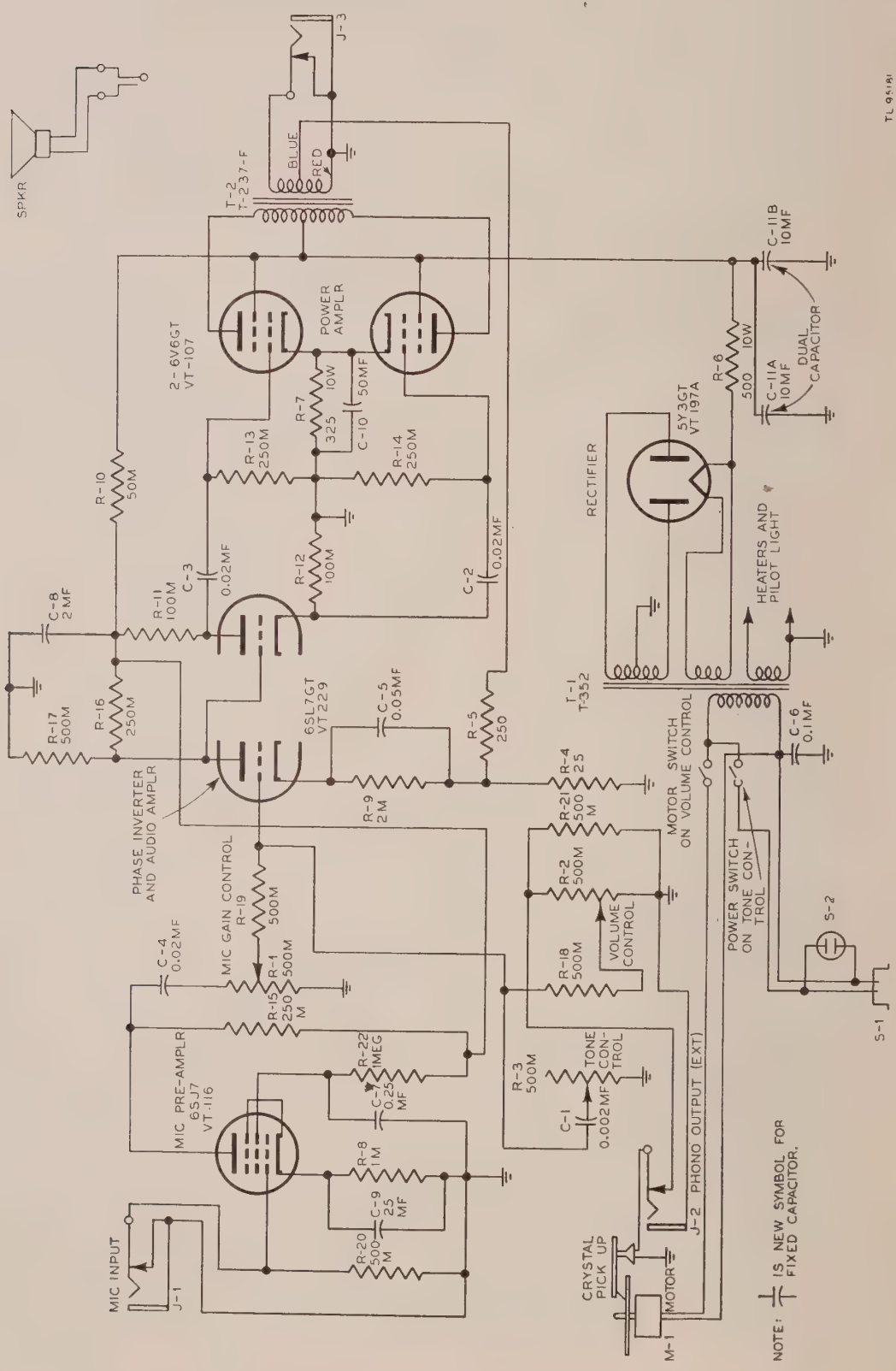


Figure 14. Schematic diagram for reproducer.

furnished with the reproducer. Test Sets I-167, I-153-A or -B, or comparable types of available test equipment are suggested.

36. TROUBLE-SHOOTING PROCEDURES.

The accompanying trouble-shooting charts, if properly used, simplify trouble shooting. Three charts are included:

a. The first chart covers sectionalization of trouble in the reproducer. This chart lists the various symptoms which may be recognized easily by the operator, and gives the probable location for the existing trouble as well as the recommended correction. It will enable the operator to isolate trouble to one particular part of the equipment, saving time that otherwise might be lost in checking trouble-free components.

b. The second chart (fig. 15) consists of normal voltage and resistance measurements of all tubes in the reproducer. As abnormal resistance and voltage measurements are an indication of trouble at the particular test point, this chart will be of assistance to the repairman in determining which stage of the amplifier is at fault.

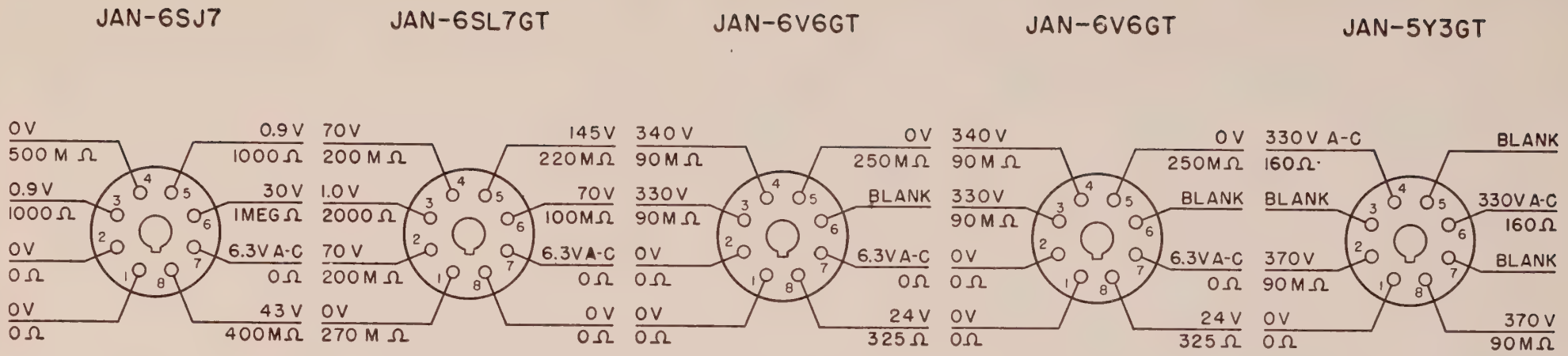
c. The third chart lists abnormal pin voltages, probable cause, and required remedy to correct the fault. This chart will enable the repairman to make a rapid check of the possible cause of trouble.

37. OPERATOR'S TROUBLE-SHOOTING CHART.

Symptom	Probable cause	Remedy
No sound output.	Power not supplied to amplifier because of loose connections or open power cord.	Check power cord for loose connections or open circuit.
	PWR OFF—PWR ON switch in OFF position.	Turn PWR OFF—PWR ON switch to ON position.
	Amplifier dead because of PHONOGRAPH or MICROPHONE volume controls not being turned up.	Turn up controls.
	Defective tube 6SJ7 (VT-116) 6SL7GT(VT-229), 6V6GT(VT-107), 5Y3GT(VT-197A).	Replace defective tube.
	No input to microphone channel because of loose connections or open cord.	Check cord and connections of microphone.

37. OPERATOR'S TROUBLE-SHOOTING CHART (contd).

Symptom	Probable cause	Remedy
No sound output.	MICROPHONE control turned down.	Turn up control.
	Defective microphone.	Replace microphone.
	Loudspeaker dead because of loose connections or open cord.	Check connections at both ends of the speaker cord and check for open cord.
	Defective loudspeaker.	Repair or replace.
Low volume.	Low line voltage supplying insufficient power to amplifier.	Check line voltage.
	PHONOGRAPH or MICROPHONE volume control turned down too low.	Turn up controls.
	Defective tubes.	Test and replace.
Distortion.	Defective tube.	Test and replace.
	Improper turntable motor speed.	Check settings of turntable motor control levers.
	Defective pick-up crystal cartridge.	Replace cartridge.
	Defective needle.	Replace needle.
	Nut on pick-up arm used to fasten arm to holding bracket loose and vibrating.	Tighten holding nut.
	Defective microphone.	Replace microphone.
Intermittent sounds.	Loose connections or open cords.	Check all cords and connections.



VOLTAGES AND RESISTANCES MEASURED TO GROUND (SOCKETS VIEWED FROM BOTTOM)
D-C VOLTAGES READ WITH 20,000 OHMS/VOLT METER.
A-C VOLTAGES READ WITH 1,000 OHMS/VOLT METER.
TUBES OUT, POWER PLUG OUT, MICROPHONE PLUG OUT, VOLUME CONTROLS MAXIMUM FOR RESISTANCE TEST.
TUBES IN, POWER ON, VOLUME CONTROLS MAXIMUM FOR VOLTAGE TESTS, LINE VOLTAGE 115V A-C.
Ω = RESISTANCE IN OHMS.
TUBES ARE SHOWN IN ACTUAL POSITION.
USE SCALES MOST SUITABLE FOR EACH MEASUREMENT.
RESISTANCE 100 TO 20,000,000 Ω.
VOLTAGE (D.C.) 10 TO 1,000 V.
VOLTAGE (A.C.) 0 TO 1,000 V.

TL 95197

Figure 15. Tube socket resistance and voltage measurements for reproducer.

38. REPAIRMAN'S TROUBLE-SHOOTING CHART.

Symptom	Probable cause*	Remedy
5Y3GT (VT-197A) no voltage on pin 8.	Capacitor C8, C11A, or C11B shorted.	Replace defective capacitor.
	High voltage winding of power transformer (T-1) shorted or open.	Replace defective power transformer.
6SJ7 (VT-116) no voltage on pin 8.	Open resistor R15 or R10.	Replace defective resistor.
No voltage on pin 6.	Open resistor R22 or shorted capacitor C7.	Replace defective resistor or capacitor.
No voltage on pin 5.	Open resistor R8 or shorted capacitor C9.	Replace defective resistor or capacitor.
6SL7GT (VT-229) no voltage on pin 2.	Open resistor R11 or shorted capacitor C8.	Replace defective resistor or capacitor.
No voltage on pin 5.	Open resistor R16 or shorted capacitor C8.	Same.
6V6GT (VT-107) no voltage on pin 3.	Open primary on transformer T-2 or shorted capacitors C11A or C11B.	Replace transformer or defective capacitor.
No voltage on pin 4.	Shorted capacitor C11A or C11B.	Replace defective capacitor.
No voltage on pin 8.	Open resistor R7 or shorted capacitor C10.	Replace defective resistor or capacitor.

*It is suggested that all troubles indicated by a lack of voltage be verified by making a resistance measurement and checking against the values given in figure 15.

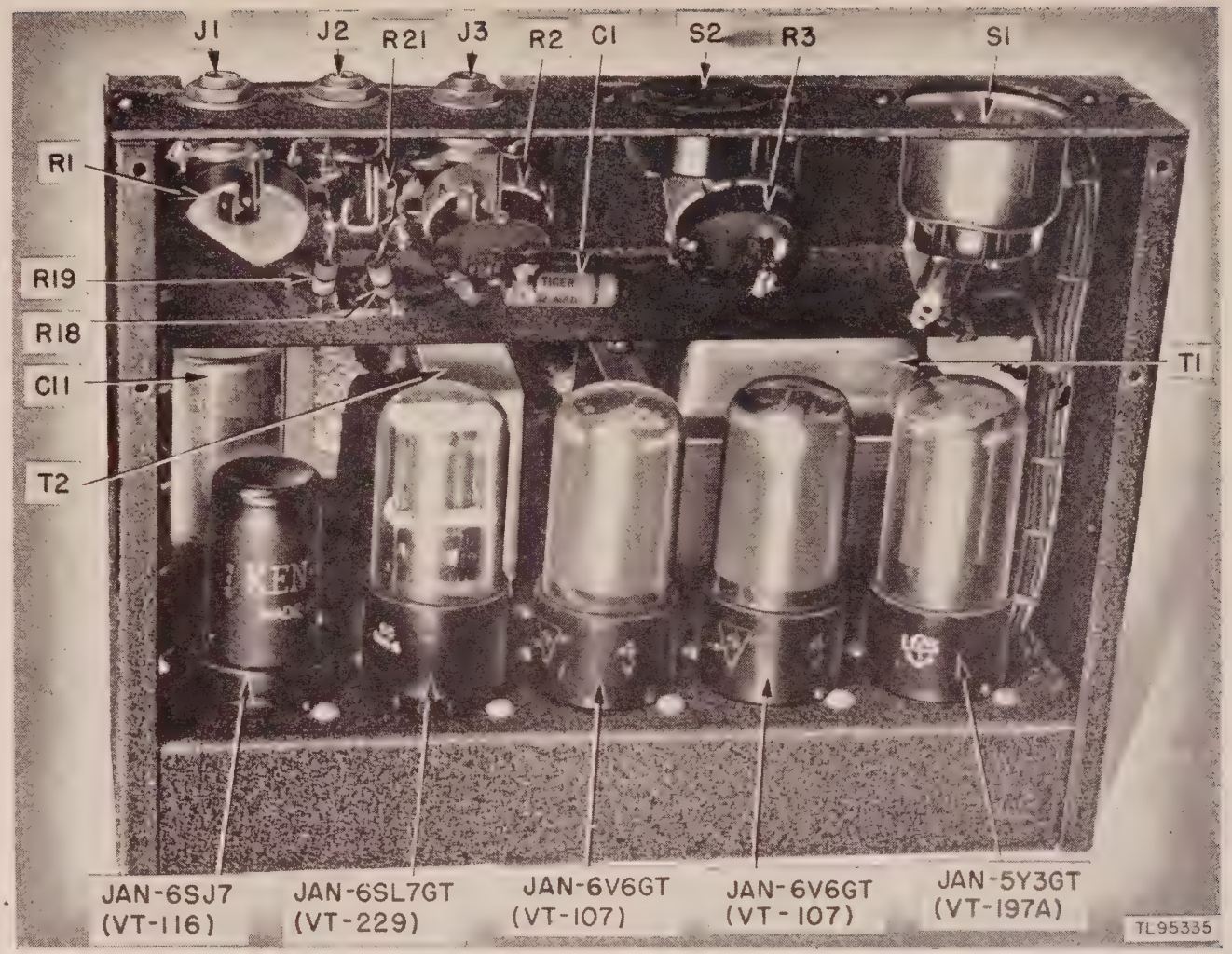


Figure 16. Reproducer amplifier chassis, rear view, grill removed.

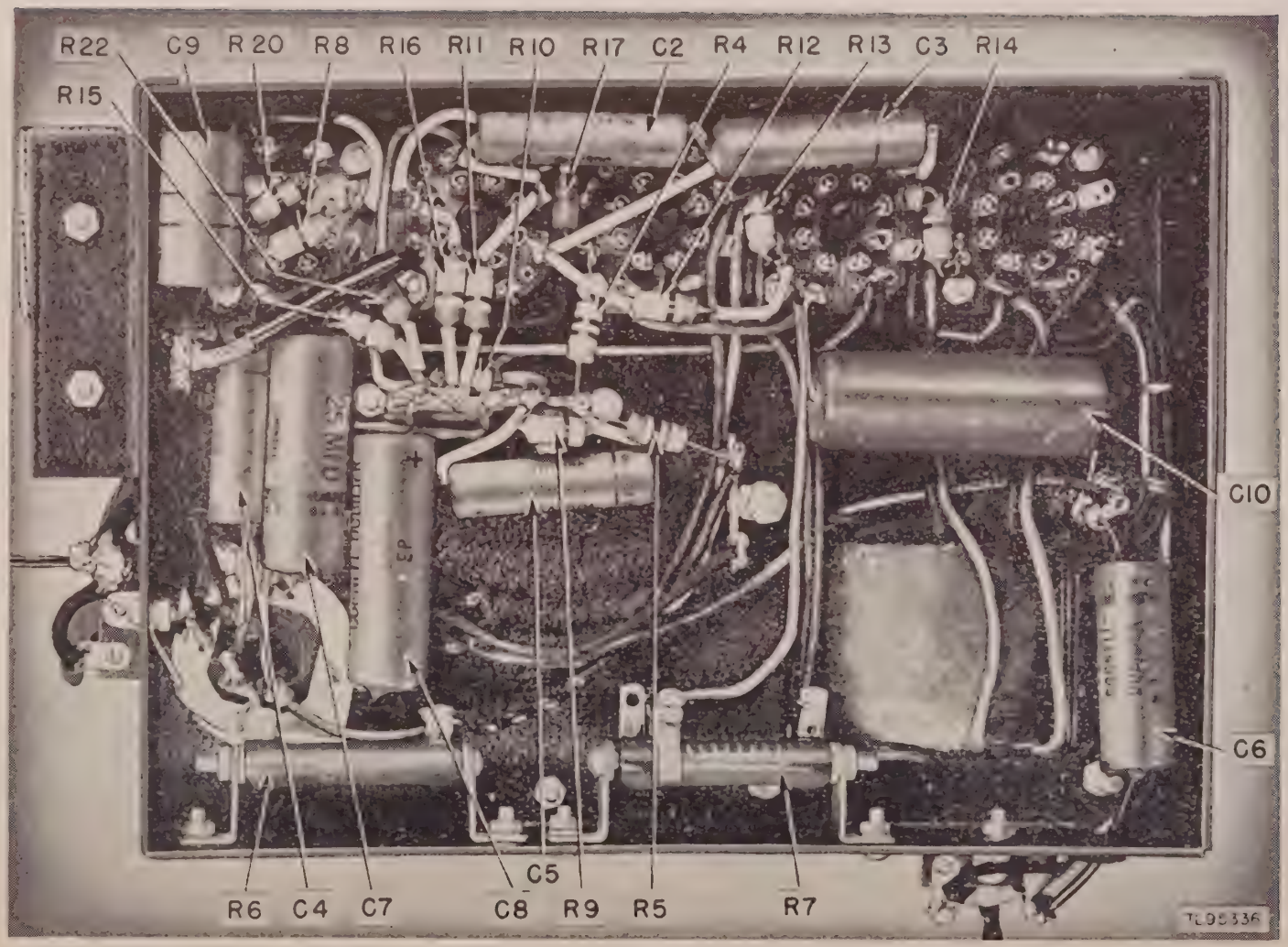


Figure 17. Reproducer amplifier chassis, bottom view.

SECTION XIII
REPAIRS

39. REPLACEMENT OF PARTS.

a. Most of the parts in Reproducer, sound, portable, are readily accessible and may be easily replaced if they are found to be faulty.

b. All parts on the control panel and the tubes may be replaced without removing the amplifier. Remove the ventilating grillwork at the rear of the control panel. It is best to remove the center tube first.

c. To replace a defective power transformer, output transformer, filter capacitor, or any part located underneath the amplifier chassis, it will be necessary to lift the complete motor board from its case. To do this proceed as follows:

(1) Remove the ten screws around the edge of the panel (fig. 3).

(2) Make sure that the pick-up arm is firmly fastened to its holder by means of the knurled locking nut (fig. 3). This will prevent damaging the pick-up arm.

(3) Lift the panel up gently.

(4) Unsolder the leads from the turntable motor and the pick-up arm from the terminal strips located in the front and at the end of the amplifier chassis.

(5) Remove the four machine screws holding the amplifier chassis to the panel. The chassis can now be placed in any position convenient for working.

d. When replacement of any part requires the disconnection of several wires, mark the wires with tags or other identifying devices to insure their proper connection when the new part is installed.

e. When replacing leads clip them as short as possible for satisfactory connection and avoid using more solder than necessary to make a secure connection. A very slight amount of excess solder dropped accidentally inside the equipment may cause other circuits or circuit elements to be short-circuited. Do not heat the lug or connection more than is absolutely necessary to make a well-soldered connection. Excess heat may damage capacitors, resistors, and wiring. When a wire is connected to a tube socket, the connecting wire should be long enough to prevent any pull on the socket. Save time and trouble by making a thorough electrical check of any part that appears to be defective *before* removing it from the equipment.

CAUTION: Avoid changing the location of parts or wiring leads. Such changes may cause feedback and oscillation.

f. When replacing mechanical parts in the equipment, use extreme care in disassembling and reassembling any mechanical units. Use screwdrivers and

other tools that fit the job at hand. Secure bolts and screws snugly, but do not overtighten them.

40. WAR DEPARTMENT UNSATISFACTORY EQUIPMENT REPORT.

a. When trouble in equipment used by the Army Ground Forces or Army Service Forces occurs more often than repair personnel feel is normal, War Department Unsatisfactory Equipment Report, W.D., A.G.O. Form No. 468 should be filled out and forwarded through channels to the Office of the

WAR DEPARTMENT
UNSATISFACTORY EQUIPMENT REPORT

FOR (Technical service) Signal Corps MATERIEL DATE 15 Oct 44
FROM (Organization) 579 Sig Repair Co (Station) APO 923 San Francisco, Cal
TO (Next superior headquarters) Signal Officer - Ninth Army (Station) (Technical service)

COMPLETE MAJOR ITEM

NOMENCLATURE: Reproducer, sound, Portable
TYPE:
MODEL:
MANUFACTURER: John Daniels Company
U. S. A. REG. NO.: Order No. 8179-Phila-44
SERIAL NO.: 20136
DATE RECEIVED: 10 Sept 44
EQUIPMENT WITH WHICH USED (IF APPLICABLE):

NOMENCLATURE OF DEFECTIVE COMPONENT

PART NO.: Sig C stock no. 321946
TYPE: Resistor: fixed; carbon, 270-ohm, 2-watt
MANUFACTURER: International Resistor Corporation
DATE INSTALLED: 15 Sept 44

LENGTH OF SERVICE

DATE OF INITIAL TROUBLE: 17 Sept 44

	TOTAL YEARS	TOTAL MONTHS	TOTAL DAYS	YEARS	MONTHS	DAYS	HOURS	MILES	ROUNDS
TIME INSTALLED	—	—	2	—	—	2	—	—	—

DESCRIPTION OF TROUBLE AND PROBABLE CAUSE

GIVE TYPE OF FAILURE, MECHANICAL, ELECTRICAL, WORKMANSHIP, MATERIAL, DESIGN
Resistor burned out because of overheating

UNUSUAL SERVICE CONDITIONS

GIVE BRIEF DESCRIPTION
Operation in temperatures exceeding 100°

TRAINING OR SKILL OF USING PERSONNEL (CHECK ONE) POOR FAIR GOOD ✓

DESCRIPTION OF ANY REMEDIAL ACTION TAKEN
Resistor replaced with one of higher wattage rating

RECOMMENDATIONS
Substitution of resistor with 5 watt rating

1ST IND.

OFFICE STATION DATE
TO CHIEF (Technical service) Signal Officer, Washington 25, D.C.
NAME
STATION RANK

ORIGINATING OFFICER

SIGNATURE: E A Wilson
NAME: E. A. WILSON
RANK AND TITLE: Capt., Sig C
ORGANIZATION: 579 Sig Repair Co

INSTRUCTIONS

1. It is imperative that the Chief of Technical Service concerned be advised at the earliest practical moment of any constructional, design, or operational defect in matériel. This form is designed to facilitate such reports and to provide a uniform method of submitting the required data.

2. This form will be used for reporting manufacturing, design or operational defects in matériel with a view to improving and correcting such defects, and for use in recommending modifications of matériel.

3. This form will not be used for reporting failures, isolated material defects or malfunctions of matériel resulting from fair-wear-and-tear or accidental damage nor for the replacement, repair, or the issue of parts and equipment. It does not replace currently authorized operational or performance records.

4. Reports of malfunctions and accidents involving ammunition will continue to be submitted as directed in the manner described in AR 750-10 (Change No. 3).

5. It will not be practicable or desirable in all cases to fill all blank spaces of the report. However, the report should be as complete as possible in order to expedite necessary corrective action. Additional pertinent information not provided for in the blank spaces should be submitted as inclosures to the form. Photographs, sketches or other illustrative material are highly desirable.

6. When cases arise where it is necessary to communicate with a chief of service in order to assure safety to personnel, more expeditious means of communication are authorized. This form should be used to confirm reports made by more expeditious means.

7. This form will be made out by using or service organizations and forwarded in duplicate through command channels to the chief of technical service. The office of the chief of technical service receiving the report will forward an information copy to the Commanding General, Army Ground Forces or Army Air Forces, whichever is applicable, and to the Commanding General, Army Service Forces.

8. Necessity for using this form will be determined by the using or service troops.

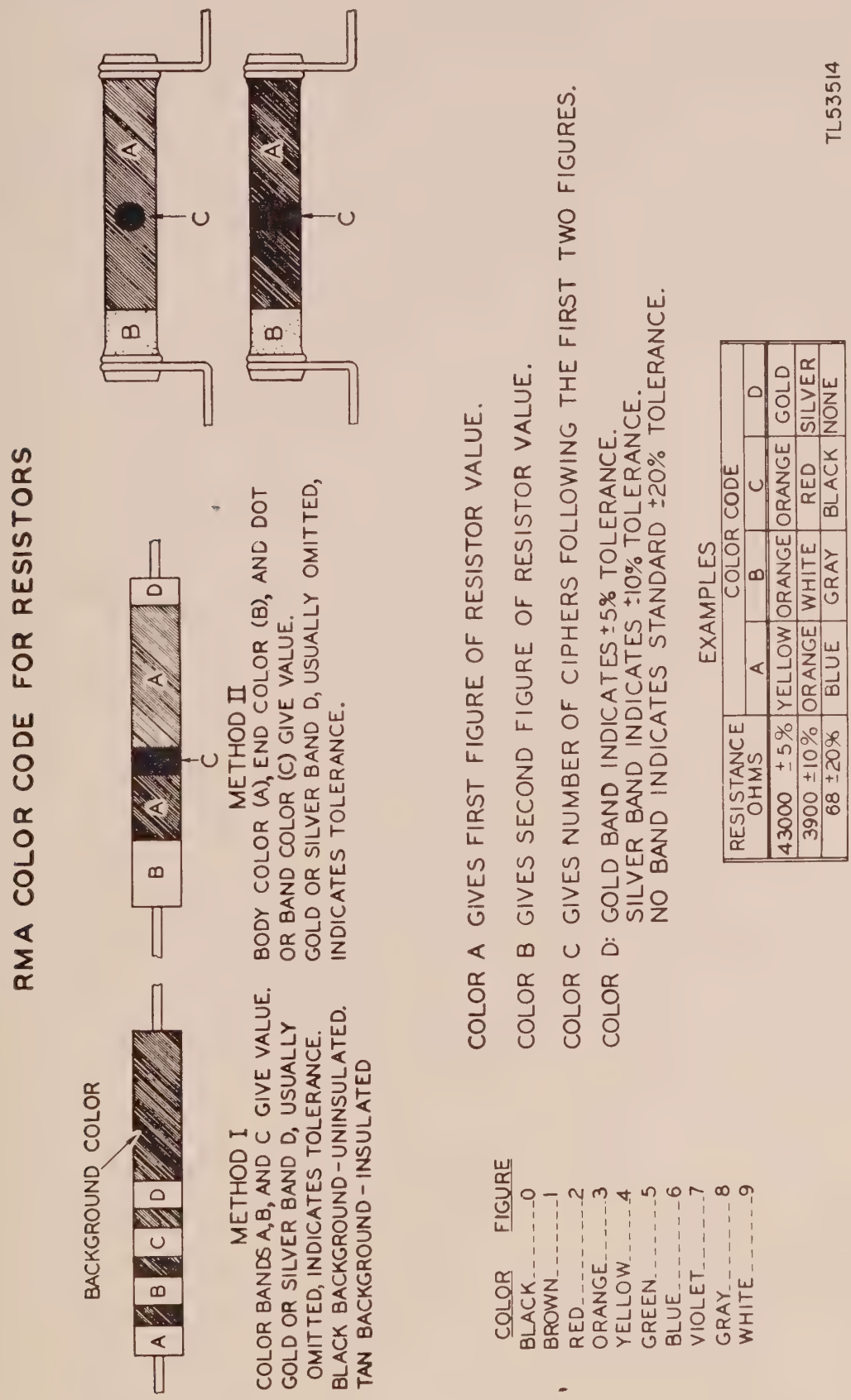
W. D., A. G. O. Form No. 468
1 December 1943

TL95175

Figure 18. W.D., A.G.O. Form No. 468 with sample entries.

Chief Signal Officer, Washington 25, D.C. Refer to TM 38-250 for complete instructions on the handling of this report.

b. When trouble in equipment used by Army Air Forces occurs more often than repair personnel feel is normal, Army Air Forces Form No. 54 should be filled out and forwarded through channels.



RESISTANCE OHMS	COLOR CODE A	B	C	D
43000 ±5%	YELLOW	ORANGE	ORANGE	GOLD
3900 ±10%	ORANGE	WHITE	RED	SILVER
68 ±20%	BLUE	GRAY	BLACK	NONE

Figure 19. RMA Color code for resistors.

SECTION XIV

MAINTENANCE PARTS LIST

41. MAINTENANCE PARTS LIST FOR REPRODUCER, SOUND, PORTABLE.

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Mfrs part and code No.	†Station stock	†Region stock
C1	3DA2-147	**CAPACITOR, fixed:** paper; 0.002 mf; 600 vdcw.	1	ZB6710H	*	*
C2, C3, C4	3DA20-116	**CAPACITOR, fixed:** paper; 0.02 mf; 400 vdcw.	3	ZB6420H	*	*
C5	3DA50-1.6	**CAPACITOR, fixed:** paper; 0.05 mf; 400 vdcw.	1	ZB4624H	*	*
C6	3DA100-49	**CAPACITOR, fixed:** paper; 0.1 mf; 400 vdcw.	1	ZB4827H	*	*
C7	3DA250-4.4	**CAPACITOR, fixed:** paper; 0.25 mf; 400 vdcw.	1	ZB4030H	*	*
C8	3DB2.9020	**CAPACITOR, fixed:** electrolytic; 2 mf; 450 vdcw.	1	EDJ9020	*	*
C9	3DB25-23	**CAPACITOR, fixed:** electrolytic; 25 mf; 25 vdcw.	1	EDJ2250	*	*
C10	3DBK50-23	**CAPACITOR, fixed:** electrolytic; 50 mf; 50 vdcw.	1	EDJ1010	*	*
C11	3DB10-91.1	**CAPACITOR, fixed:** electrolytic; dual; 2 x 10 mf; 450 vdcw.	1	UP7811	*	*

	3E4059-23	**CABLE ASSEMBLY, power:** 10 ft long; 2-conductor; No. 18 AWG; 2-prong male contact connector on one end, 2-prong female contact connector on other end.	1			*
	1B3018	**CORD, loudspeaker:** 75 ft, 2-conductor, No. 18 stranded rubber-covered conductor; (for connecting loudspeaker).	1			*
	3E7142-3	**CORD, amplifier:** 10 ft, single conductor, No. 18 AWG, shielded with copper braid; (for connecting to external amplifier).	1			*
J1, J2, J3	2Z5540	**JACK, telephone:** single circuit, normally closed.	3	2Z	*	*
	2Z58227	**KNOB, bar:** black; molded phenolic.	3	S2921L	*	*
	2Z5952	**LAMP, incandescent:** 6.3 v, 0.15 amp.	1		*	*
	6C35-14.1	**LOUDSPEAKER, dynamic:** permanent magnet; voice coil 6 ohm impedance; 8-inch diameter cone.	1	PM8C		
	2B1746-1	**MICROPHONE, dynamic:** includes 25 ft shielded cord and plug.	1	D4T		*
M1	3H3000AO5-24	**MOTOR, AC:** induction type; 110 v AC, 60 cyc, single ph, shaded pole, squirrel cage.	1	D-2SP		
	6C172/C1	**PICKUP CARTRIDGE:** astatic B1.	1		*	*
	2Z7155	**PLUG, telephone:** 2 conductor.	2	PL55		
S1	2Z3022-1	**RECEPTACLE:** male; 2-prong.	1	61M1		

† Parts not stocked in station or region stock are carried in depot stock.
* Indicates stock available.

41. MAINTENANCE PARTS LIST FOR REPRODUCER, SOUND, PORTABLE (contd).

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Mfrs part and code No.	†Station stock	†Region stock
S2	6Z7784-1	**RECEPTACLE:** female; 2-prong.	1	61F1		
R1	2Z7272.1	**RESISTOR, variable:** potentiometer; carbon; 500,000 ohms; 1 w.	1	V202L	*	*
R2, R3	2Z7272.2	**RESISTOR, variable:** potentiometer; carbon; 500,000 ohms; 1 w; includes switch.	2	V218L	*	*
R4	3RC21AE250J	**RESISTOR, fixed:** carbon; 25 ohms; ½ w.	1	504B	*	*
R5	3RC21BE241J	**RESISTOR, fixed:** carbon; 250 ohms; ½ w.	1	504B	*	*
R6	3Z6050-17	**RESISTOR, fixed:** wire-wound; 500 ohms; 10 w.	1		*	*
R7	3Z6032A5-4	**RESISTOR, fixed:** carbon; 325 ohms; 10 w.	1		*	*
R8	3RC21BE102J	**RESISTOR, fixed:** carbon; 1,000 ohms; ½ w.	1	504B	*	*
R9	3RC21BE202J	**RESISTOR, fixed:** carbon; 2,000 ohms; ½ w.	1	504B	*	*
R10	3RC21BE513J	**RESISTOR, fixed:** carbon; 50,000 ohms; ½ w.	1	504B	*	*
R11, R12	3RC21BE104J	**RESISTOR, fixed:** carbon; 100,000 ohms; ½ w.	2	504B	*	*
R13, R14 R15, R16	3RC21BE274J	**RESISTOR, fixed:** carbon; 250,000 ohms; ½ w.	4	504B	*	*

R17, R18 R19, R20 R21	3RC21BE514J	**RESISTOR, fixed:** carbon; 500,000 ohms; ½ w.	5	504B	*	*
R22	3RC21BE105J	**RESISTOR, fixed:** carbon; 1 meg; ½ w.	1	504B	*	*
	2Z8678.120	**SOCKET, tube:** wafer: octal.	5	6714	*	*
T1	2Z9613.326	**TRANSFORMER, power:** (primary 117 v ac, 50-60† cps: 70-va, secondary No. 1, 700 v, 84 ma, center tap; secondary No. 2, 6.3 v, 1.65 amp: secondary No. 3, 5 v, 2 amp).	1	T352		*
T2	2Z9632.278	**TRANSFORMER, AF:** output: (two windings: primary 10,000 ohms, secondary 6 ohms).	1	T237		*
	2J6SJ7	**TUBE:** JAN-6SJ7.	1	6SJ7	*	*
	2J6SL7GT	**TUBE:** JAN-6SL7GT.	1	6SL7GT	*	*
	2J6V6GT	**TUBE:** JAN-6V6GT	2	6V6GT	*	*
	2J5Y3GT	**TUBE:** JAN-5Y3GT.	1	5Y3GT	*	*

† Parts not stocked in station or region stock are carried in depot stock.
* Indicates stock available.

SECTION XV
REFERENCES

42. ARMY REGULATIONS.

AR 380-5. Restricted Documents.

43. PARTS LIST.

SIG 3 ..... List of Items for Troop Issue.

SIG 4-1 ..... Allowances of Expendable Supplies.

SIG 4-2 ..... Allowances of Expendable Supplies for Schools, Training Centers, and Boards.

SIG 5 ..... Stock List of All Items.

SIG 7 (series) ..... Organizational Spare Parts.

SIG 8 (series) ..... Higher Echelon Spare Parts.

*SIG 10 ..... Fixed Plant.

44. TECHNICAL MANUALS ON AUXILIARY EQUIPMENT.

*TM 11-408 ..... Projectors PH-222 and PH-222-A.

TM 11-2626 ..... Test Unit I-176.

TM 11-2627 ..... Tube Tester I-177.

45. PAINTING, PRESERVING, AND LUBRICATION.

SB 11-10 ..... Signal Corps Kit and Materials for Moisture- and Fungi-resistant Treatment.

TB SIG 13 ..... Moistureproofing and Fungiproofing Signal Corps Equipment.

TM 9-850 ..... Cleaning, Preserving, Sealing, Lubricating, and Related Materials Issued for Ordnance Materiel.

46. OTHER TECHNICAL PUBLICATIONS.

FM 21-6 ..... List of Publications for Training.

FM 21-7 ..... List of Training Films, Film Strips, and Film Bulletins.

TM 1-455 ..... Electrical Fundamentals.

TM 11-455 ..... Radio Fundamentals.

47. FORMS.

W.D., A.G.O.

Form No. 468 .. Unsatisfactory Equipment Report.

* When published.

Army Air Forces
Form No. 54 . . . Unsatisfactory Report.

48. ABBREVIATIONS.

a-c . . . . . alternating current.
amp . . . . . ampere.
AWG . . . . . American Wire Gauge.
cps . . . . . cycles per second.
d-c . . . . . direct current.
JAN . . . . . Joint Army-Navy.
mf . . . . . microfarad.
MIC . . . . . microphone.
RPM . . . . . revolutions per minute.
SAE . . . . . Society of Automotive Engineers.
Spec . . . . . specification.
SPKR . . . . . speaker.
v . . . . . volt.
vdcw . . . . . volts, direct-current, working.
w . . . . . watt.
W.D., A.G.O. . . . . War Department, Adjutant General's Office.
x . . . . . by.